

Studies of *Juncus* (Juncaceae) in the Sino-Himalayan Region I. Notes on Some Species in Southwest China

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Four little known species of *Juncus* (Juncaceae) in the Sino-Himalayan floristic region are reported. Full descriptions and drawings of the following species are given: 1) *Juncus concolor* Sam.; 2) *Juncus dongchuanensis* K.F.Wu; 3) *Juncus longiflorus* (A.Camus) Noltie; 4) *Juncus milashanensis* A.M.Lu & Z.Y.Zhang.

Key words: *Juncus*, Sino-Himalaya, taxonomy, description

The genus *Juncus* is much diversified in the Sino-Himalayan floristic region. Since Buchenau (1885) this genus in the region has been studied by several taxonomists and more than 100 species have been reported (Camus 1910, Samuelsson 1936, Satake 1966, 1971, 1975, Noltie 1994a, 1994b, 1998, Wu 1994, Zhang and Lu 1994). A considerable number of the species have been described based on one or a few specimens. In spite of former taxonomic studies, some species of *Juncus* have not yet been successfully circumscribed for the lack of reliable diagnostic characters. In 1996 and 1997 we made field observations in the Hengduan Mountains, southwest China (see Ikeda and Miyamoto 1996, 1998) and examined the variation among populations. Since having published taxonomic notes of the Sino-Himalayan *Juncus* (Miyamoto and H.Ohba 1993, 1995, 1997a, 1997b), we need to publish further notes based on our field and herbarium works in this series.

1) ***Juncus concolor* Sam.** in Hand.-Mazz.,

Symb. Sin. 7: 1232 (1936).

Type: China. Yunnan, Prope urbem Yangbei, 2600–3000 m (Handel-Mazzetti 3359, 30 Jun. 1914, W-lecto!, selected here, S-isolecto!).

Rhizomes creeping, 0.3–0.7 mm across. Flowering stems erect, terete, 10–38 cm long, with 3–6 basal sheaths. Leaves terete, auricles round; basal leaves absent; basal sheath 1.6–4.0 cm long, apex acuminate, straw-colored; caudine leaf solitary, longer than or sometimes same as long as inflorescence, linear, 10–24 cm long including sheath, 1.0–1.5 mm wide, sheath 1.0–3.0 cm long. Inflorescence a single capitulum with 5–20 flowers and 3–5 bracts, 1.0–2.0 cm across, ivory-white; bract lanceolate, 3.0–9.0 mm long, 0.7–4.3 mm wide, light brown; lowest bracts shorter than flower, lanceolate, 7–9 mm long, 3.4–4.3 mm wide, light brown. Flowers 6.5–9.5 mm long, 2.0–2.5 mm wide, pedicellate; pedicels 0.8–2.4 mm long; perianth lanceolate, inner ones almost same as long as outer, 4.8–5.5 mm long, 1.2–1.5 mm

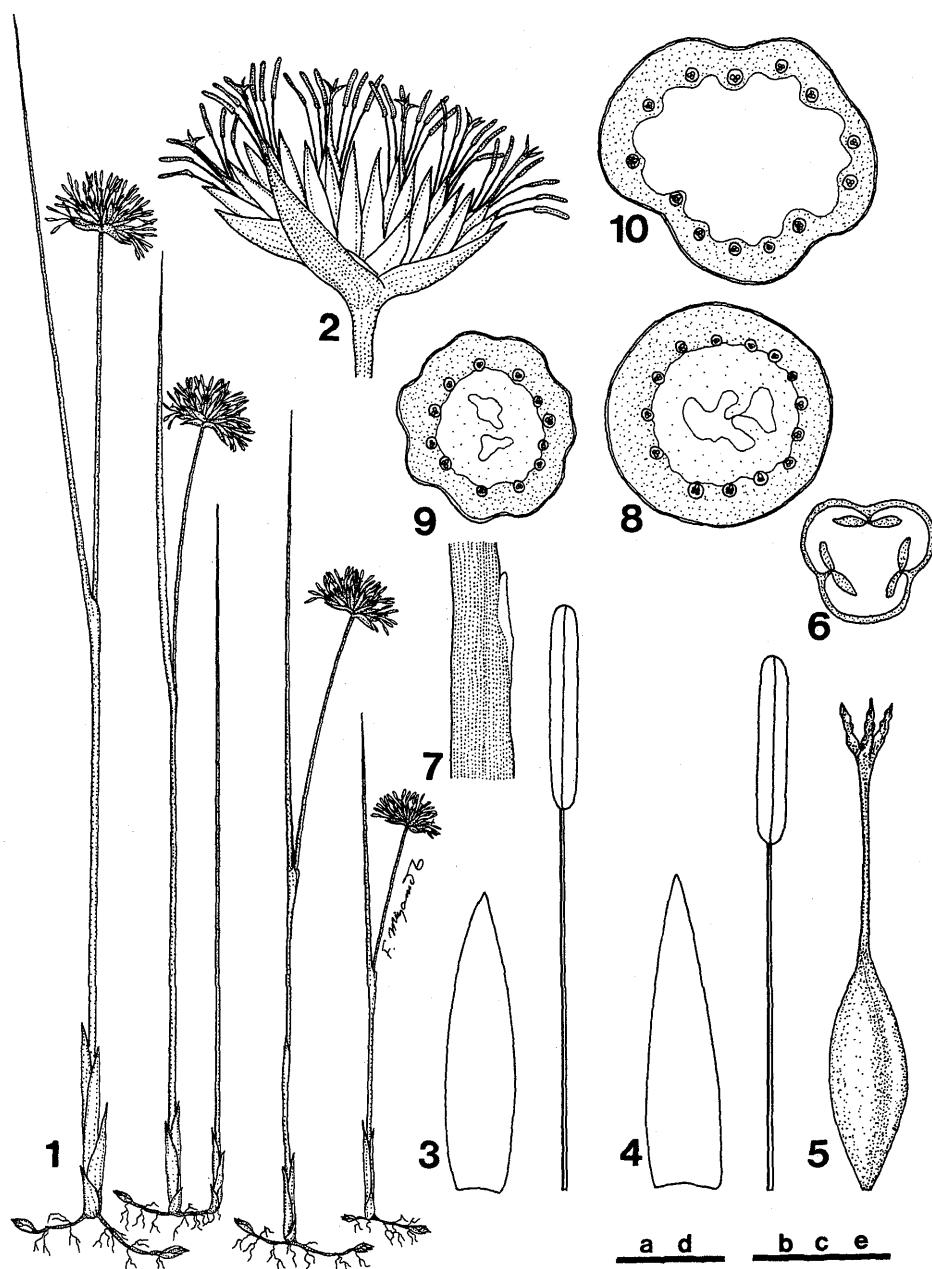


Fig. 1. *Juncus concolor* Sm. (Wu et al. 475). 1: Habit. 2: Inflorescence. 3: Outer perianth and stamen. 4: Inner perianth and stamen. 5: Ovary. 6: Cross section of ovary. 7: Leaf auricle. 8: Cross section of lower part of stem. 9: Cross section of upper part of stem. 10: Cross section of cauline leaf. Scales: a (2 cm) for 1; b (5 mm) for 2 and 7; c (2.5 mm) for 3, 4, and 5; d (1 mm) for 6; e (0.6 mm) for 8, 9, and 10.

wide, ivory-white. Stamens 6, longer than perianth, ivory-white, 7.3–8.7 mm long; filament 4.8–6.0 mm long; anther linear-elliptic, 2.5–2.8 mm long. Pistils 2.9–3.4 mm long, ivory-white; stigmas 3, 0.6–0.9 mm long; styles 2.3–3.5 mm long; ovaries ovoid-trigonous, 2.5–4.0 mm long, 1.0–1.4 mm wide.

Distribution: SW China (W Yunnan).

Other specimens examined: W Yunnan: Yangbi, around Cangshan, Yangbi side, alt. 3800 m (Wu et al. 475, 17 Aug. 1997, KUN, TI); loc. cit. alt. 3820 m (Wu et al. 476, 17 Aug. 1997, KUN, TI).

Juncus concolor has been known only the type specimen collected in the west side of Cangshan, Yunnan Province by Handel-Mazzetti in 1914. We have collected this on grassy slope at elevation of 3800–3820 m near the type locality. At present this species occurs only in Cangshan in Yunnan Province.

Juncus concolor is similar to *J. allioides* Franch., *J. cephalostigma* Sam., *J. glaucoturgidus* Noltie, *J. leucanthus* Royle & D. Don, and *J. trachyphyllus* Miyam. & H. Ohba, but differs apparently in having stoloniferous rhizome, and straw-colored basal sheath and the lack of basal leaf. Differences among the similar species are presented in the following key.

Key to the species of *J. concolor* and allied species

1. Basal leaf absent
2. Rhizome stoloniferous; basal sheath straw-colored *J. concolor*
2. Rhizome very short; basal sheath shining chestnut-brown *J. leucanthus*
1. Basal leaf present
3. Cauline leaf with small blade (3–7 mm long), sheath chestnut-brown, auricle obliquely truncate *J. cephalostigma*
3. Cauline leaf with large blade (1–3 cm long), sheath straw-colored, auricle rounded
4. Surface of leaf and stem smooth *J. allioides*
4. Surface of leaf and stem scabrid

5. Basal leaf grooved *J. trachyphyllus*
5. Basal leaf not grooved *J. glaucoturgidus*

2) *Juncus dongchuanensis* K.F.Wu in Acta Phytotax. Sin. 32: 457, f. 5 (1994) (Fig. 2)

Type: China. C Yunnan, Dongchuan Shi, Fazhelin, alt. 2500–2700 m (Diandongbeizu 500, 12 Aug. 1964, KUN-holo!).

Rhizomes very short, densely branched, clustered. Flowering stems erect, 10–30 cm long, terete, several grooved, with 3–6 shining yellowish brown basal sheaths. Leaves terete, with several grooved, auricles rounded; basal leaves absent, sheath 1–3 cm long; caudine leaf solitary, linear, 10–28 cm long including sheath, 0.7–2.0 mm wide, sheaths 1–4 cm long; leaves on sterile shoots with one blade, 8–28 cm long. Inflorescence 2–3(–4) heads with several flowers, 5–10 mm across, light-green; peduncle of lateral head 0.5–5.0 cm long; sheath-like bract on peduncle, membranous, lanceolate, 1.5–2.0 mm long; bracts linear-lanceolate, 0.2–3.0 cm long, 0.6–2.0 mm wide; lowest bract shorter than inflorescence, linear-lanceolate, terete, 1.0–3.0 cm long, 1.5–2.0 mm wide. Flowers ordinary or viviparous, mixed with in same capitulum. Ordinary flowers 0.6–0.8 cm long, 2.2–2.5 mm wide, pedicellate; pedicels 0.5–1.2 mm long; perianth ovate-lanceolate to lanceolate, inner ones slightly longer than outer, 5.5–6.8 mm long, 0.9–1.3 mm wide; outer ones 4.3–4.6 mm long, 0.8–1.4 mm wide, light-green. Stamens 6, longer than perianth, inner ones shorter than outer, 0.8–1.0 cm long, outer ones 1.1–1.2 cm long; filament 5.6–8.0 mm long; anther shorter than filament, linear-elliptic, ivory-white, 2.0–3.5 mm long. Pistils 2.4–2.8 mm long; stigmas 3, 0.6–0.8 mm long; styles 1.8–2.0 mm long; ovaries ovoid-trigonous, 5.0–6.0 mm long, 1.5–1.9 mm wide. Viviparous flowers 3.5–6.0 mm long, 0.7–1.5 mm wide, light-green, stamens and pistils degenerated.

Distribution: SW China (W & C Yunnan).

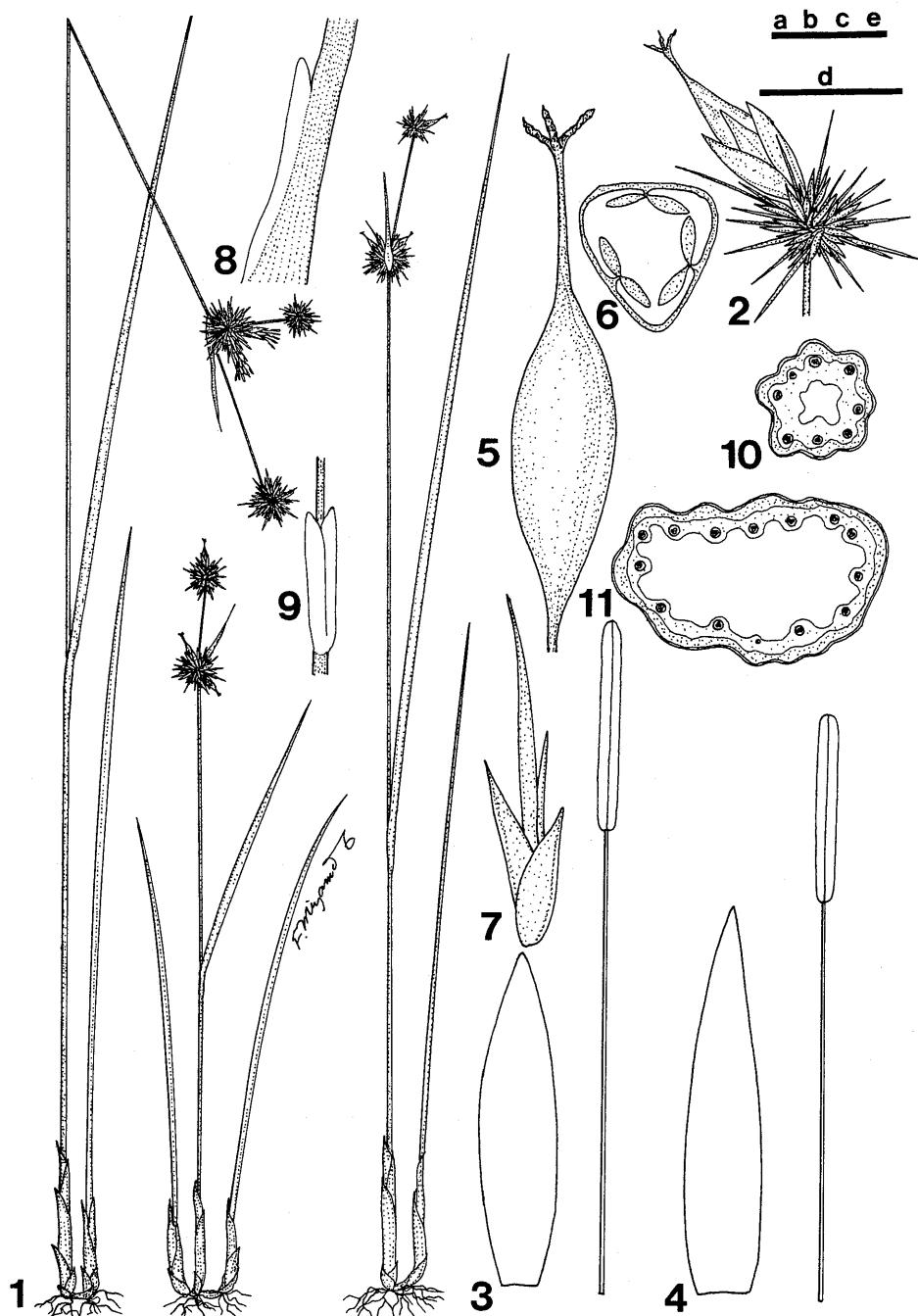


Fig. 2. *Juncus dongchuanensis* K.F.Wu (Wu et al. 1611). 1: Habit. 2: Inflorescence. 3: Outer perianth and stamen. 4: Inner perianth and stamen. 5: Ovary. 6: Cross section of ovary. 7: Proliferous flower. 8: Leaf auricle. 9: Sheathing bract on peduncle. 10: Cross section of lower part of stem. 11: Cross section of cauline leaf. Scales: a (2 cm) for 1; b (7.5 mm) for 2; d (5 mm) for 8 and 9; e (2.5 mm) for 3, 4, 5, and 7; e (1 mm) for 6, 10, and 11.

Other specimens examined: Yunnan: without precise locality (Delavay 6660, 6556, Aug. 1895, P); loc. cit. (Delavay 3165, 20 Aug. 1887, P); Huize, Dahihenshan, alt. 3350 m (Dongchuandui 63-122, 27 Sep. 1963, KUN); Tali fu, alt. 3000–3400 m (Schneider 2498, Aug. 1914, K); Tsang shan, alt. 3460 m (collector unknown CLD-90 1246, 15 Oct. 1990, K); Ta-li Hsien, alt. 2600 m (Tsai 53917, 29 Jul. 1933, KUN); Dali, Cangshan, 25°40'N, 100°07'E, alt. 3410 m (Wu et al. 1611, 1 Sep. 1996, KUN, TI).

Juncus dongchuanensis is similar to *J. concinnus* D.Don, but differs in having shining yellowish brown basal sheath, filaments 2.5 times as long as anthers and the lack of basal leaf. This species grew on bank by path in *Abies* forests at the elevation of 3400 m in Mt. Cangshan with *Juncus concinnus*.

3) *Juncus longiflorus* (A.Camus) Noltie in Edinb. J. Bot. 51: 134 (1994).

Juncus sikkimensis Hook.f. var. *longiflorus* A.Camus in Notulae Systematicae 1: 283 (1910).

Type: China. Yunnan, lieux humides ou peu ombragés du Tsang-chan (Cang shan), alt. 4000 m (Delavay 2806, 27 July 1887, P-lecto! selected by Noltie in 1994); coteaux près de l'arête du Tsang-chan, alt. 4000 m (Delavay 4065, 30 Aug. 1889, S-para!).

Juncus sikkimensis Hook.f. var. *helvolus* K.F.Wu in Acta Phytotax. Sin. 32: 461 (1994), **syn. nov.**

Type: China. Yunnan, Deqin, alt. 3800 m (Feng 6594, 13 Aug. 1940, PE-holo! KUN-iso!)

Juncus sikkimensis Sam. in Hand.-Mazz., Symb. Sin. 7: 1232 (1936), p.p.

Rhizomes densely branched, caespitose. Flowering stems erect or ascending, densely tufted, 20–50 cm long, 0.4–0.7 mm wide, with 3–6 basal sheaths and one basal leaf. Leaves terete, auricles rounded, only basal, 10–30 cm long, 0.4–0.7 mm wide; sheaths 3.0–4.0 cm long, acute, shining yellowish brown; leaves on sterile shoots, 25–70 cm long, 0.3–0.6 mm wide, sheaths same as long as basal leaves. Inflorescence solitary, capitate with 3–5 flow-

ers and 2 bracts, 2.0–3.7 cm long, 1.0–2.0 cm wide, chestnut-brown; bracts longer than flowers, 1.3–2.0 cm long, 5.0–9.0 mm wide; sheath-like bract absent; lowest bract linear-lanceolate, 2.5–3.7 cm long, 4–6 mm wide, chestnut-brown. Flowers 0.8–1.5 cm long, 2.2–3.5 mm wide, pedicellate; pedicels 0.5–5.0 mm long; perianth lanceolate, inner ones shorter than outer, 5.0–8.0 mm long, 1.1–1.6 mm wide, outer ones 5.5–9.4 mm long, 1.5–1.8 mm wide, chestnut-brown. Stamens 6, shorter than perianth, outer ones 2.8–3.2 mm long, inner ones 2.6–3.0 mm long; filament 0.8–1.0 mm long; anther linear-elliptic, leather-yellow, 0.8–1.0 mm long, longer than filament. Pistils 6.0–8.5 mm long; stigmas 3, 3–4.5 mm long; styles 3.0–4.0 mm long; ovaries ovoid-trigonous, 2.5–3.0 mm long, 1.5–1.8 mm wide.

Distribution: Tibet, China (NW Yunnan).

Other specimens examined: Tibet: without precise locality (Soulié 1154, 17 Jul. 1895, S); Tsekou (Soulié 2754, 18 Jul. 1895, P). Yunnan: Boggy pasture on the eastern flank of the Tali Range, Lat. 25°40'N, alt. 9000–10000 ft. (Forrest 4894, Jun. 1906, B, P); In regione alpina jugi Sila inter fluvios Landsang-djiang (Mekong) et Lu-djiang (Salween), alt. 4400 m (Handel-Mazzetti 8433, 29 Sep. 1915, P, S, W); Gongshan Xian, Kongmu, Dadui, alt. 3500–3880 (Lin et Den 791033, 17 Jul. 1979, KUN); Gongshan, Yako, Dulongjian (Lin et Den 790550, 1979, KUN); Gongshan, Changputong, alt. 3700–3800 m (Feng 7878, 20 Sep. 1940, KUN, PE); Bijiang, Biluoxueshan, alt. 3500–3700 m (Nujiandiaochadui 0882, 18 Jun. 1978, KUN, indicated as a type specimen of *J. bijiangensis* S.Y.Bao, in sched); Tali Hsien, alt. 4000 m (Tsai 53987, 31 July 1933, KUN, PE); Dali, alt. 3400 m (Wang 63260, May 1935, KUN, PE); Dali, Cangshan, Zhonghefen (Zhongdiandui 63-3801, 2 Aug. 1963, KUN); Deqin, Cangjiang, alt. 3800–4000 m (Feng 6594, 13 Aug. 1940, KUN); Yangbi Xian, W side of Diancang Shan mountain range, alt. 3500–3600 m (Bartholomew et al. 585, 26 June 1984, KUN); Dali Xian, alpine meadow near the summit of Diancang Shan mountain range in the vicinity of Yingfeng Peak, directly W of Dali city, alt. 3900 m (Bartholomew et al. 1035, 11–12 July 1984, KUN); Dali, Cangshan, alt. 3630 m, 25°40'N, 100°07'E (Wu et al. 1604, 1 Sep. 1996, KUN, TI); ibid., alt. 3800 m (Wu et al. 1605, KUN, TI); ibid., alt. 3900 m (Wu et al. 1607, KUN, TI); Yangbi, around Cangshan, alt. 3850 m (Wu et al. 477, 17 Aug. 1997, KUN, TI);

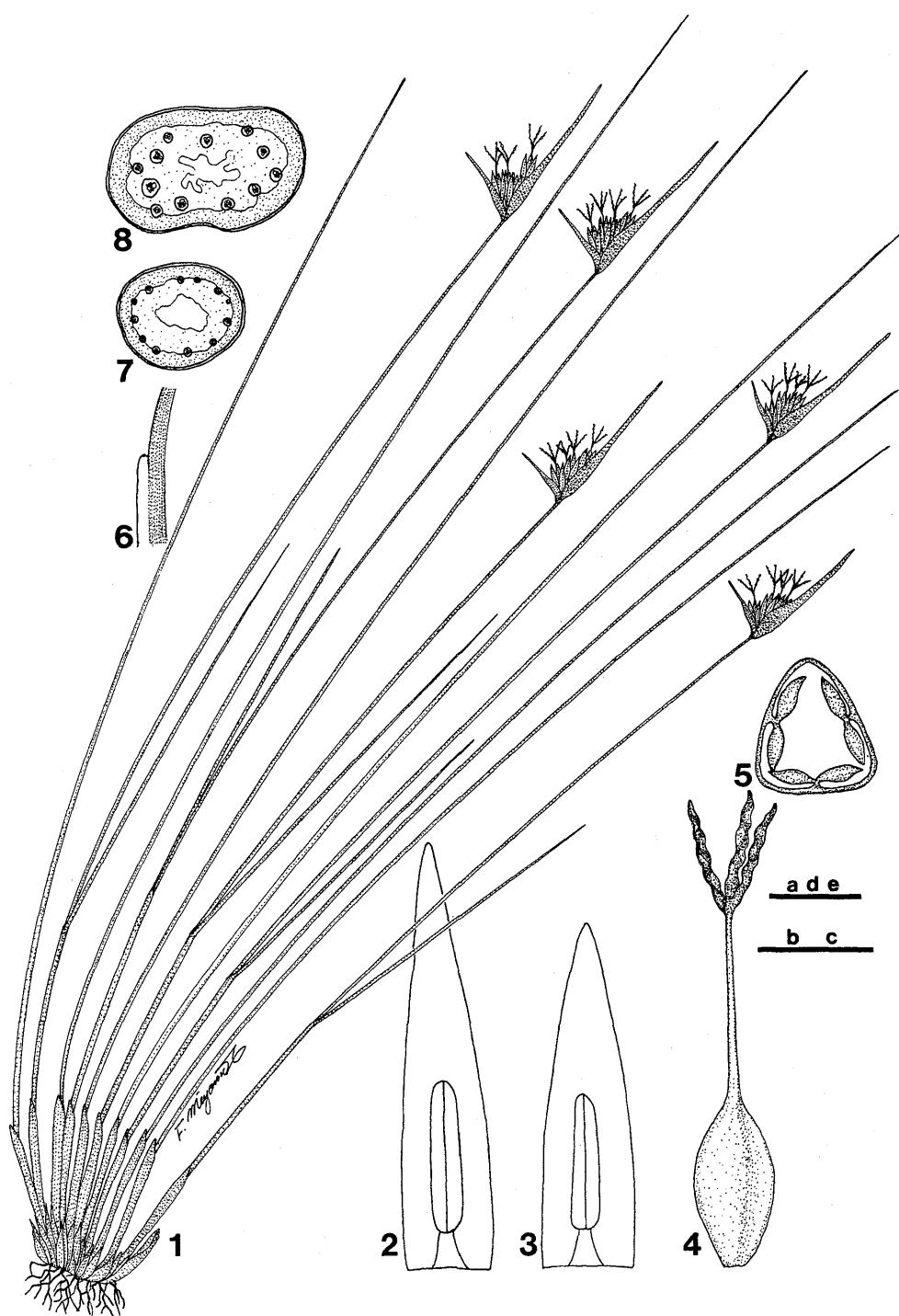


Fig. 3. *Juncus longiflorus* (A.Camus) Noltie (Wu et al. 1604). 1: Habit. 2: Outer perianth and stamen. 3: Inner perianth and stamen. 4: Perianth. 5: Ovary. 6: Leaf auricle. 7: Cross section of lower part of stem. 8: Cross section of basal leaf. Scales: a (2 cm) for 1; b (2.5 mm) for 2, 3, 4; c (1.6 mm) for 5; d (4 mm) for 6; e (0.6 mm) for 7 and 8.

Bijiang, Biluoxueshang, alt. 3500–3700 m (Nujiang team 0882, 18 Jun. 1978, KUN, as *J. bijiangensis* S.Y.Bao, in sched.).

Juncus longiflorus is characterized by the densely tufted stems from caespitose rhizomes. This has been often misidentified as most similar to *J. sikkimensis*, especially for fragmental or incomplete specimens. Indeed *J. longiflorus* is similar to *J. sikkimensis* Hook.f. as well as *J. rhotangensis* A.K.Goel & B.S.Aswal and but differs in having leaves on sterile shoots longer than or sometimes as long as the inflorescence, shining yellowish brown basal sheaths, and the lack of sheath-like bract.

Juncus sikkimensis var. *helvolus*, described from a specimen collected in Deqin (Feng 6594, 13 Aug. 1940, KUN-iso!), is also identical with *J. longiflorus*.

Juncus longiflorus occurs in grassland on exposed slopes near the ridge at the elevation of 3600–3900 m in Mt. Cangshan while *J. pseudocastaneus* (Lingelsh.) Sam. and *J. sikkimensis* are in bogs or humid places by creeks.

4) ***Juncus milashanensis* A.M.Lu & Z.Y.Zhang in Acta Phytotax. Sin. 17: 127, f. 2-6-10 (1979).**

Type: Tibet, Mi-La Shan, alt. 5200 m (Chang & Long 2734, 16 Sept. 1965, PE-holo!); Lhasa, alt. 4800–5000 m (Chang & Long 2413, 1 Sep. 1965, PE, KUN-para!).

Rhizomes creeping with scaly leaves, sometimes densely branching and clustered, 1.0–2.0 mm across. Flowering stems erect or ascending, terete, multi-grooved, 5–25 cm long with 4–8 basal leaves and 3–4 basal sheaths, sometimes remaining old leaves at base. Leaves flattened multi-grooved on abaxial side, grass-like, auricles obliquely truncate; the basal leaves 1.0–6.0 cm long including sheath, 0.8–3.0 mm wide, sheath 0.5–3.0 cm long; cauline leaves 0(–1), linear-lanceolate, 1.0–4.0 cm long, 2.0–3.0 mm wide, shorter than inflorescence. Inflorescence 1–2(–3), capitate with 4–

10 flowers and 2 bracts, 0.8–2.0 cm across, chestnut-brown; bract linear-lanceolate to lanceolate, 0.5–4.5 cm long, 2.0–4.0 mm wide; sheath-like bract on peduncle, membranous, lanceolate, 0.5–1.0 cm long; lowest bract longer than flowers, sometimes same as long as flower, linear-lanceolate, 1.0–4.5 cm long, 2.3–4.0 mm wide, flattened, multi-grooved on abaxial side, grass-like, green with chestnut-brown base. Flowers 1.0–1.5 cm long, 2.5–3.5 mm wide, pedicellate; pedicels 0.6–4.5 mm long; perianth ovate-lanceolate, inner ones slightly longer than outer, 5.0–8.0 mm long, 0.9–1.4 mm wide; outer ones 4.5–7.7 mm long, 0.8–1.3 mm wide, chestnut-brown. Stamens 6, shorter than perianth, 2.7–4.5 mm long; anther longer than the filament, linear-elliptic, leather-yellow, 1.8–3.0 mm long; filament 0.9–1.5 mm long. Pistils 4.5–6.2 mm long; stigmas 3, 3.0–4.0 mm long, red; styles 1.5–2.2 mm long; ovaries ovoid-trigonous, 2.5–3.3 mm long, 1.0–1.5 mm wide.

Distribution: Tibet, SW China (Sichuan).

Other specimens examined: Sichuan: Daocheng, around Wuming Shan, alt. 4680 m (Wu et al. 410, 27 July 1997, KUN, TI); ibid., around Gongga Shan, alt. 4550 m (Wu et al. 450, 4 Aug. 1997, KUN, TI).

Juncus milashanensis is similar to *J. amplifolius* A.Camus, *J. nepalicus* Miyam. & H.Ohba and *J. pseudocastaneus* (Lingelsh.) Sam.. These species have been confused. *Juncus milashanensis* differs from those in having abaxially multi-grooved flattened and grass-like leaves, anthers longer than filament, and red-colored stigmas. *Juncus milashanensis* occurs on open scree slopes. Lu and Zhang (1979) described this as having erect rhizome, but actually its rhizome is shortly creeping.

Although *J. milashanensis* has been reported only from Tibet, we found it around Wuming Shan and Gongga Shan in Sichuan Province. Zhang and Lu (1994) listed *J. milashanensis* in Yunnan Province with reference to a specimen collected in Yangbi (Zhang

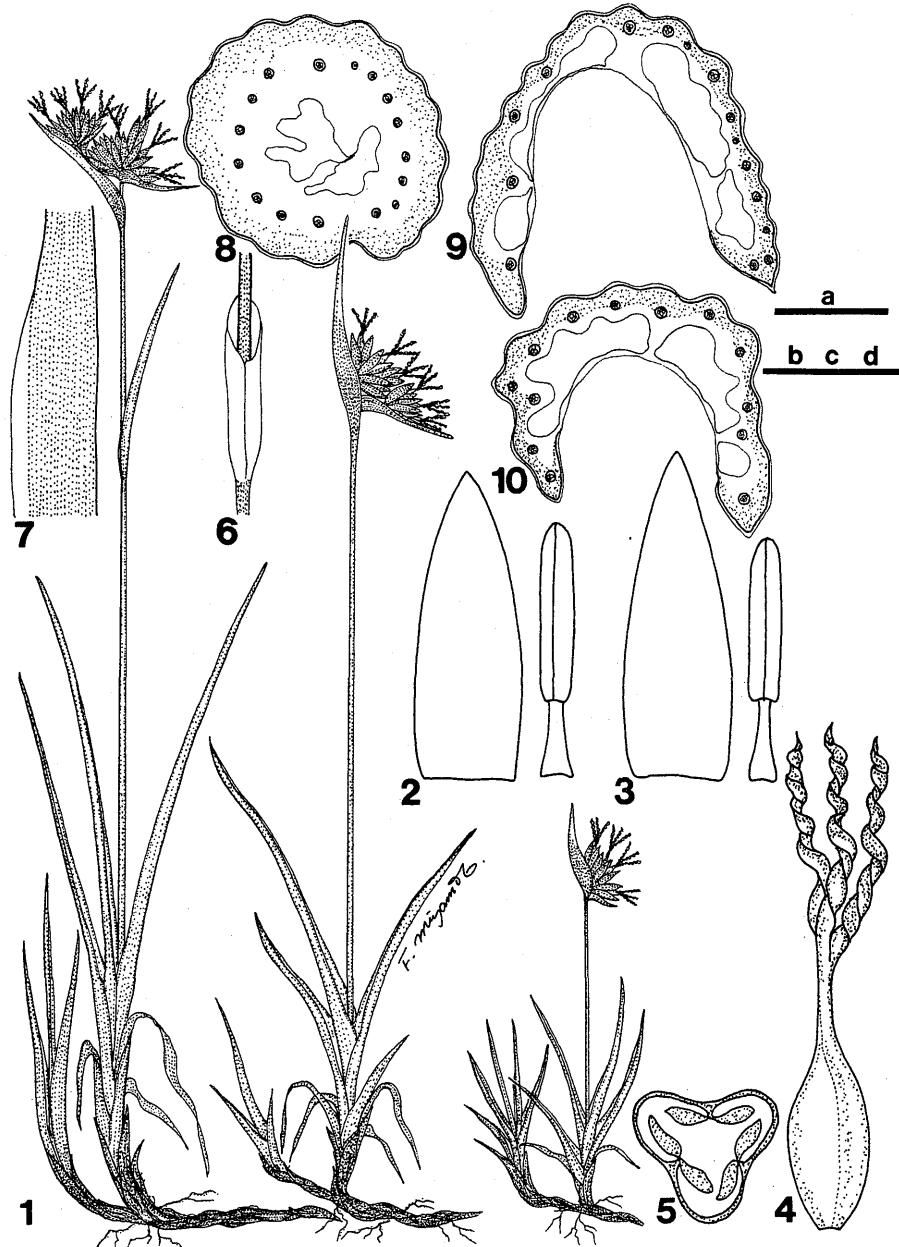


Fig. 4. *Juncus milashanensis* A.M.Lu & Z.Y.Zhang (Wu et al. 410). 1: Habit. 2: Outer perianth and stamen. 3: Inner perianth and stamen. 4: Ovary. 5: Cross section of ovary. 6: Leaf auricle. 7: Sheathing bract on peduncle. 8: Cross section of stem. 9: Cross section of basal leaf. 10: Cross section of cauline leaf. Scales: a (2 cm) for 1; b (5 mm) for 6 and 7; c (2.5 mm) for 2, 3, and 4; d (0.3 mm) for 5, 8, 9, and 10.

and Lu 1206), but the specimen is *J. concinnus*.

Key to the species of *J. longiflorus*, *J. milashanensis* and allied species are as follows:

1. Sheath-like bract absent on peduncle
2. Leaves on sterile shoots longer than or sometimes same as long as inflorescence; leaf and stem without grooves; stems tufted *J. longiflorus*
2. Leaves on sterile shoots shorter than inflorescence; leaf and stem with several grooves; stems non tufted *J. rohtangensis*
1. Sheath-like bract present on peduncle
3. Leaf flattened, grass-like
4. Anther twice as long as filament; stigma red *J. milashanensis*
4. Anther shorter than or same as long as filament; stigma cream-yellow
5. Anther shorter than filament; cauline leaf present *J. nepalicus*
5. Anther same as long as filament; cauline leaf absent *J. amplifolius*
3. Leaf terete, aciculate
6. Rhizome stoloniferous *J. pseudocastaneus*
6. Rhizome short, densely branched *J. sikkimensis*

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宮本 太^a, 大場秀章^b: 中国-ヒマラヤ植物区系におけるイグサ属植物の分類学的研究 I. 中国南部における数種の分類学的ノート

イグサ属植物は、中国-ヒマラヤ植物区系において多様化した分類群のひとつであり、これまでに100種以上が記録されている。しかし、いくつかの種においては信頼できる分類形質が少なく、1点または少数の標本に基づいて記載された種も多いなど、実体が明らかでない種が多い。そこで筆者らは本地域のイグサ属植物の分類学的再検討を進めている。

- 1) *Juncus concolor* Sam. はこれまでタイプ標本以外には知られていないため、その実体は不明であった。1997年にタイプ産地である雲南省蒼山で調査をおこない、本種を再発見した。本種は *J. allioides* Franch., *J. cephalostigma* Sam., *J. glaucoturgidus* Noltie, *J. leucanthus* Royle & D. Don および *J. trachyphyllus* Miyam. & H. Ohba に似るが、基部の葉を持たないこと、走出枝をだすこと、基部の鞘状葉がわら色を呈することで区別される。
- 2) *Juncus dongchuanensis* K.F.Wu は *J. concinnus* D. Don に似るが、基部の葉をもたないこと、基部鞘状

葉は光沢のある黄褐色を呈すること、花糸が葯の2.5倍長であることで明らかに区別される。蒼山では標高3500m付近の低木林わきの岩上に着生していた。

- 3) *Juncus longiflorus* (A.Camus) Noltie は茎が密に叢生し、根茎が大きな株状になる特徴をもつ。本種は *J. sikkimensis* に似るが、基部の鞘状葉が光沢のある黄褐色を呈すること、花柄に鞘状になる苞を持たないことで区別される。本種は標高4000m付近の日当たりのよい草地に生育していた。
- 4) *Juncus milashanensis* A.M.Lu & Z.Y.Zhang はチベットから記載されたものである。本種は *J. amplifolius* A. Camus, *J. nepalicus* Miyam. & H. Ohba および *J. pseudocastaneus* (Lingelsh.) Sam. に似るが、葉が針状葉とならないこと、葯が花糸より長いこと、開花期の柱頭が赤色となることで明確に区別される。

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